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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/284,222	07/22/1999	HISASHI TSUJIMOTO	P990708	2037

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EXAMINER	
DOVE, TRACY MAE	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 02/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/284,222	TSUJIMOTO ET AL.
	Examiner	Art Unit
	Tracy Dove	1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7-9 and 12-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7-9 and 12-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 July 1999* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the communication filed on 10/6/03. Applicant's arguments have been considered, but are not persuasive. Claims 7-9 and 12-18 are pending. Claims 1-6, 10 and 11 have been canceled. This Action if made **FINAL**.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-9 and 12-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 7 recites "the binder comprising a mixture of a fluorine polymer and an aromatic vinyl-conjugate diene polymer", and further recites, "wherein the mixture of the fluorine polymer and the aromatic vinyl-conjugate diene polymer of the binder ranges from 10 weight percent to about 15 weight percent of a total weight of the negative electrode". The specification only supports a binder amount of 10-15 wt% when the binder *consists of* the fluorine polymer and the aromatic vinyl-conjugate diene polymer. See page 6 and the Examples of the instant specification.

Claims 17 and 18 recite weight mixture ratios of the fluorine polymer to the aromatic vinyl-conjugate diene polymer. However, the recited weight ratios are only supported when

polyvinylidene fluoride (PVDF) is the fluorine polymer and styrene-butadiene latex (SBR) is the aromatic vinyl-conjugate diene polymer. See Examples 3 and 4 regarding the ratios disclosed by claims 17 and 18. Note that SBR is the only specific aromatic vinyl-conjugate diene polymer disclosed by the specification (see page 6).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7-9, 12 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al., JP 06-215761, as evidenced by Koga et al., US 5,565,284 and Sonobe et al., US 5,527,643 and Hasegawa et al., US 5,609,975 and Yamada et al., US 5,576,121.

Ozaki teaches a nonaqueous electrolyte rechargeable battery comprising a positive electrode, a negative electrode, an electrolyte and a separator. The positive electrode is formed by applying an active material paste to both sides (first and second positive layers) of an aluminum foil (current collector). See paragraph 0026. The positive active material may be $LiCoO_2$ (paragraph 0022). The negative electrode contains a graphite (carbonaceous) active material and a mixed binder material. The binder is a mixture of a non-fluorine system organic polymer and a fluorine system organic polymer. A paste containing graphite and the mixed binder is applied to both sides (first and second negative layers) of a copper foil (current collector). See paragraph 0011. The non-fluorine system organic polymer may be styrene-butadiene rubber (aromatic vinyl-conjugate diene polymer) and the fluorine system organic

polymer may be polytetrafluoroethylene (paragraph 0027). The fluorine system organic polymer is 20-50 wt% of the mixed binder (paragraph 0016). Thus, if the fluorine system polymer is 50 wt% of the binder, a weight ratio of fluorine system polymer to non-fluorine system polymer is 1:1. The positive electrode and negative electrode are wound via a separator and put is a case to form a cylindrical shape cell (paragraph 0025 and Figure 1). A carboxymethyl-cellulose thickening agent may be added to the negative electrode (paragraphs 0019 and 0027). The negative electrode material is not limited to graphite, but may be carbon materials such as cokes, mesophase carbon, pyrolytic carbon, mesophase pitch and carbon fiber (paragraph 0012).

Ozaki does not explicitly state the binder comprises 10-15 wt% of the negative electrode.

However, Ozaki teaches the binder comprises 3-7 wt% of the negative electrode. Less than 3 wt% binder is inadequate and results is capacity degradation. More than 7 wt% results in a decreased pack density, decreased conductivity and increased internal resistance.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found the claimed binder range of 10-15 wt% obvious in view of the teachings of Ozaki. Ozaki teaches that if the binder content is greater than 7 wt% a cell having undesirable properties, such as decreased conductivity, increased internal resistance and decreased pack density, results. Thus, Ozaki suggests a binder content greater than 7 wt%, though it results in a battery with undesirable properties. Thus, the burden shifts to Applicant to show the claimed binder range of 10-15 wt% is critical and/or establish the claimed binder range has unexpected results. Specifically, Applicant must show that the expected result of increasing the binder content to 10-15 wt% does not result in decreased conductivity, increased internal resistance and/or decreased pack density

(expected result based on the teachings of the prior art). It is well known that increasing the binder content of the negative electrode decreases capacity and increases internal resistance of the battery. This is because increasing the binder content results in less space available for the active material of the negative electrode. Less active material results in decreased capacity. Increasing the binder content results in greater distance between the particles of the active material, thus increasing the internal resistance of the battery. This is evidenced by Koga, Sonobe, Hasegawa and Yamada. Koga teaches the amount of binder added is preferably about 3-13 parts by weight per 100 parts by weight of the electrode material. Smaller amounts of binder material provide less adhesion whereas larger amounts of binder material result in an insufficient cell capacity (col. 6, lines 36-41). Sonobe teaches if the amount of the binder is excessive, the resultant electrode is liable to have too large an electric resistance and provide a battery with a large internal resistance (col. 8, lines 44-51). Hasegawa teaches a smaller amount of active material undesirably lowers the capacity of the electrode while a greater amount of binder prevents smooth current collection that lowers the capacity (col. 12, lines 62-66). Yamada teaches increasing the binder amount of the electrode increases resistance and reduces the discharge capacity of the battery. All four evidence references are directed toward lithium secondary batteries.

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Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al., JP 06-215761 (as evidenced by Koga et al., US 5,565,284 and Sonobe et al., US 5,527,643 and Hasegawa et al., US 5,609,975 and Yamada et al., US 5,576,121) in view of Abe et al., JP 8-195201.

See discussion of Ozaki above.

Ozaki does not explicitly teach the amount of the cellulose derivative added to the negative electrode.

However, Abe teaches a nonaqueous battery negative electrode mix which is high in viscosity. Abe teaches that it is known to mix water and carboxymethyl cellulose (CMC) together, then add polyvinylidene fluoride, acetylene black and graphite to obtain the negative electrode mix. Abe teaches that aggregates such as binder aggregate and carbon aggregate in the negative electrode mix can be reduced without the viscosity of the negative electrode mix being lowered. Abe teaches the CMC was added in an amount of 0.5-5 wt% as a thickener to the binder composition (see paragraphs [0008] and [0010]).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include 0.1-5 wt % of CMC in a binder composition of Ozaki because Abe teaches this amount of CMC is known. Ozaki teaches a CMC thickening agent is added to the negative electrode. One of skill would be motivated to combine Abe and Ozaki because they both teach negative electrodes for nonaqueous batteries containing carbon material, a binder material and CMC. Abe is applied to show a prior art teaching of an amount of CMC added to the negative electrode mix. Both Abe and Ozaki teach that CMC is added to the negative electrode mix as a thickening agent.

Response to Arguments

Applicant's arguments filed 10/6/03 have been fully considered but they are not persuasive.

35 U.S.C. 112, 1st paragraph

Claim 7 recites "the binder comprising a mixture of a fluorine polymer and an aromatic vinyl-conjugate diene polymer", and further recites, "wherein the mixture of the fluorine polymer and the aromatic vinyl-conjugate diene polymer of the binder ranges from 10 weight percent to about 15 weight percent of a total weight of the negative electrode". The specification only supports a binder amount of 10-15 wt% when the binder *consists of* the fluorine polymer and the aromatic vinyl-conjugate diene polymer. See page 6 and the Examples of the instant specification. The binder percentages found only in the examples of the specification for a specific fluorine polymer and/or a specific aromatic vinyl-conjugate diene polymer does not reasonably provide enablement for all fluorine polymers and/or aromatic vinyl-conjugate diene polymers. The specification broadly discloses 2-15 wt% of a binder in the negative electrode (page 6), however, the specification does not support the claimed binder range 10-15 wt% of claim 7 because claim 7 is not limited to the specific polymers used in the examples that teach 10 wt% of a binder for the negative electrode.

Claims 17 and 18 recite weight mixture ratios of the fluorine polymer to the aromatic vinyl-conjugate diene polymer. However, the recited weight ratios are only supported when polyvinylidene fluoride (PVDF) is the fluorine polymer and styrene-butadiene latex (SBR) is the aromatic vinyl-conjugate diene polymer. See Examples 3 and 4 regarding the ratios disclosed by claims 17 and 18. Note that SBR is the only specific aromatic vinyl-conjugate diene polymer disclosed by the specification (see page 6). Weight ratios disclosed only in a specific example of the specification are applicable to only those materials used in the example.

35 U.S.C. 112, 2nd paragraph

The 35 U.S.C. 112, 2nd, rejection of claim 14 has been withdrawn.

Applicant argues, "applicants have discovered that when the mix of the fluorine polymer and the aromatic vinyl-conjugate diene polymer is utilized as the binder, a capacity required for the battery can be effectively maintained". However, Applicant did not "discover" the mix of the fluorine polymer and the aromatic vinyl-conjugate diene polymer utilized as the binder. Ozaki teaches the polymer mix for use as a binder. The only claim limitation not taught by Ozaki is the weight percentages of the mix of the fluorine polymer and the aromatic vinly-conjugate diene polymer utilized as the binder. However, the specification does not show any evidence of criticality for the weight percent range. Furthermore, the specification teaches that 5 wt% of binder contained in the negative electrode results in the prevention of a rise in temperature. Furthermore, the binder is only indirectly related to the battery capacity. As clearly shown by the prior art cited by the Examiner higher amounts of binder result in reduced capacity due to less space available for the active material of the negative electrode.

The Examiner cannot allow the claimed invention because a binder percentage of 10-15 wt% based on the total weight of the negative electrode is not allowable subject matter. Applicant's own disclosure teaches that 15 wt% of the binder results in reduced capacity (Table 2). This is well within the knowledge of one having ordinary skill in the art. Specifically, it would have been obvious to use a known binder (Ozaki teaches the binder polymer mix) for the negative electrode in an amount of 10-15 wt% in order to reduce the capacity of the battery. Note Applicant states Table 2 of the specification demonstrates that the claimed binder content provides beneficial effects with respect to the initial capacity and the short circuit temperature. However, Table 2 does not demonstrate beneficial effects for the claimed binder range (10-15 wt%). Specifically, Table 2 shows that for a binder content of 5 wt%, the initial capacity and

short circuit temperature results lie between those results indicated for a binder content of 10 wt% and a binder content of 15 wt %. Evidence of unexpected results must be between the instant claims and the prior art of record. Since a binder content of 5 wt% falls with the binder content range of the prior art, Applicant has not distinguished the instant claims over Ozaki.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (571) 272-1285. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (571) 272-1291. The Art Unit receptionist can be reached at (571) 272-1700 and the official fax number is 703-872-9306.

February 2, 2004

Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700